

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :

G06F 13/38, 15/173

A1

(11) International Publication Number:

WO 00/70473

(43) International Publication Date: 23 November 2000 (23.11.00)

(21) International Application Number: PCT/US00/12258

(22) International Filing Date: 5 May 2000 (05.05.00)

(30) Priority Data:

09/310,456

12 May 1999 (12.05.99)

US

(71) Applicant: LODGENET ENTERTAINMENT CORPORATION [US/US]; 3900 West Innovation Street, Sioux Falls, SD 57107 (US).

(72) Inventors: STOEL, Leon, P.; 1127 Connor Trail, Sioux Falls, SD 57103 (US). BANKERS, David, M.; 2634 E. Regency Court, Sioux Falls, SD 57103 (US). CINCO, Christopher, Alan; 5404 Drexel Drive, Sioux Falls, SD 57106 (US).

(74) Agents: ZINGER, David, F. et al.; Sheridan Ross P.C., Suite 1200, 1560 Broadway, Denver, CO 80202-5141 (US).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

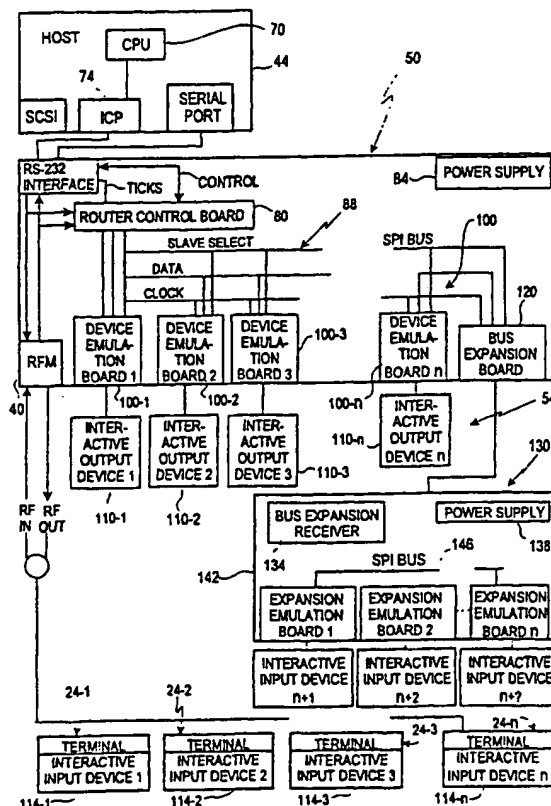
Published

With international search report.

(54) Title: ENTERTAINMENT/INFORMATION SYSTEM HAVING DISPARATE INTERACTIVE DEVICES

(57) Abstract

An information/entertainment system having a number of interactive input and output devices (114, 110) is provided. Each interactive input device (114) is electrically connected to a selected output device (110) using a host (44) that communicates with a router apparatus (50). The router apparatus (50) includes a plurality of emulation assemblies (100). Each emulation assembly (100) is configured to communicate input information to a particular interactive output device (110). Input information from a particular interactive input device (114) is received and properly handled by a pre-configured emulation assembly (100) which is electrically connected to the interactive output device (110) associated with that particular interactive input device (114). This emulation assembly (100) formats the information/data that it receives so that it is acceptable to the interactive output device (110) to which it is connected. The host (44) obtains input information using a slot/subslot arrangement associated with interactive interrogations or polling. The slots/subslots enable the system to obtain inputs at different transmission rates from different interactive input devices (114).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

ENTERTAINMENT/INFORMATION SYSTEM HAVING DISPARATE INTERACTIVE DEVICES

FIELD OF THE INVENTION

The present invention relates to a network system and, in particular, to
5 integrating interactive devices having different requirements into an entertainment and/or
information system for use, e.g., in a building complex having a number of rooms.

BACKGROUND OF THE INVENTION

Numerous and relatively large lodging complexes, such as hotels, have included
certain entertainment and/or information accessing features in their rooms in order to
10 attract customers. In addition to conventional TV programs that can be accessible from
each room, other entertainment, shopping and/or business-related options are made
available through television screen displayed menus. These include video on demand,
shopping networks, world wide web accessibility and video games that are played
independently of the world wide web. The number and kind of interactive devices are
15 expected to increase. Such devices may be marketed by one or more companies and could
have different network requirements and/or operation-associated protocols. Current
entertainment systems require that present and expected future interactive devices be
adapted to their system. That is, in order to properly function with present entertainment
systems, the interactive device and/or the entertainment system itself must be modified
20 so that they are compatible with each other. No current entertainment system permits the
plugging in or other interconnection of each and any interactive device without first
incorporating compatibility changes.

Related to the physical connectivity requirements, it is also necessary to
effectively gather input data from users of the system in order to respond within an
25 acceptable time interval. Some interactive devices, such as web browsers and video
cassette players, have less stringent requirements as applied to the time within which a
response needs to be generated. On the other hand, some interactive devices have
substantially greater input rates and, in order to meet customer expectation, these devices
require that relatively rapid responses be generated by the system and returned to the
30 interactive devices. For example, players of video games do not want to experience
delays that they are not responsible for when playing these games. Accommodations and
balancing among these different interests associated with interactive devices must be

made in order to achieve user acceptance without inefficient or wasteful use of system capability and system components.

It would be advantageous, therefore, to devise an entertainment/information system that facilitates the integration of present and future interactive devices into the system. In the ideal situation, essentially no adaptation of the system and/or interactive device is required. Rather, the version of the interactive device that is marketed to users through other distribution channels is the same version that is readily and effectively interconnected to the particular entertainment/information system.

SUMMARY OF THE INVENTION

In accordance with the present invention, a system is provided in which devices including interactive devices are integrated into the system while eliminating, or substantially reducing, system and/or interactive device modification to achieve the integration. The system includes a plurality of guest terminal subsystems. At least some of the guest terminal subsystems include one or more interactive input devices. These interactive input devices can include a keyboard, mouse, TV remote, video game stations or other input devices. Two or more of the interactive input devices require a different network communication/connection or interface, such as the following serial interfaces: asynchronous RS-485; asynchronous RS-232; and synchronous TTL.

Each of the guest terminal subsystems communicates with a head end system located remotely therefrom and electrically connected thereto using a distribution system. The head end system also includes a router apparatus that communicates with both the host and the guest terminal subsystems. The router apparatus communicates with an output device system that is comprised of a number of interactive output devices. The interactive output devices can include video games, web browsers and video cassette players, for example. The router apparatus is electrically disposed intermediate the host and the distribution system. Generally, inputs from the interactive input devices of the guest terminal subsystems are received by both the router apparatus and the host. The router apparatus includes a head end controller that has overall control of providing the inputs from the interactive input devices of the guest terminal subsystems to the proper interactive output device.

The head end controller communicates with a number of emulation assemblies. Each of the emulation assemblies is electrically connected to one of the output devices of the output device system. Each of such emulation assemblies is configured to properly communicate and function with the output device to which it is connected. In one
5 embodiment, the emulation assemblies are only configured when they are manufactured and before shipment to their final destination. In another embodiment, each of the emulation assemblies is re-configurable at the user's site using host processing and software so that it can be made compatible with each interactive input device. By way of example, a first emulation assembly can be configured so that it is compatible with a
10 first interactive input device and an associated first interactive output device. A second emulation assembly functions with a second interactive input device and a second interactive output device. The second emulation assembly can be re-configured so that it now is functionally compatible with the first interactive input and output devices, but is not compatible with the second interactive input and output devices. As can be
15 appreciated, this flexibility or adaptability enables the router apparatus to be configured or customized for a particular lodging facility owner/operator, who might want different numbers and/or sets of output devices than another hotel or lodging complex.

Each emulation assembly has an input interface and an output interface. The input interface communicates with a router bus that includes a data line for carrying input
20 information that is to be provided to interactive output devices of the output device system through the selected output interfaces of the appropriate emulation assemblies. In that regard, each emulation assembly input interface accepts only that data or other information that is specifically directed to it. The head end controller supplies an output device address unique to the particular output device that is to receive the designated
25 information. Consequently, unless the input interface of the particular emulation assembly recognizes its address accompanying the current input data, it essentially ignores such data.

With regard to obtaining input information during the operations or workings of the input interactive devices, the head end system, particularly the host, initiates a series
30 of interactive interrogations. Each interactive interrogation is directed to all active input devices in the system. Each interactive interrogation typically includes a number of slots and a number of subslots. Each slot has a predetermined time interval. In one

embodiment, each slot has a time interval of $1/60^{\text{th}}$ of a second. Each subslot has a predetermined time interval that relates to a division of the slot time interval. For example, each subslot is a division of $1/60^{\text{th}}$ of a second (i.e., $1/30$, $1/20$, $1/15$, etc.). Each activated input device is assigned to a slot or subslot in a slot, which make up the interactive interrogation. Input data or information from an interactive input device is assigned a particular slot or subslot in a slot primarily based on the response time to be given to the particular input device. Generally, when an input device requires a relatively faster response time, it is given a slot assignment that enables the system to provide the fast response time. By way of example, when the input device is an interactive video game input device, because of the nature of the inputs being provided at a rapid rate by the player and the need to receive immediate responses, such an input device would be assigned to a particular slot. And, in the example where the slot has a $1/60^{\text{th}}$ time interval associated with it, the system would check for new input information from this interactive input device at $1/60^{\text{th}}$ of a second intervals. With respect to input devices that can be checked for inputs less frequently, they can be assigned a subslot within a particular slot. For example, accessing the world wide web using a web browser by means of a keyboard or mouse, typically involves less frequent or less rapid inputs by the user. Such an interactive input device could be assigned a first subslot in a particular slot. As an example only, there might be two subslots associated with a particular slot. For the first subslot in this slot, input information is provided by such an interactive input device during this first subslot time interval. For the second subslot of this particular slot, it is not utilized to receive any input from the input device that is assigned to the first subslot, but may receive input information from another input device that is assigned to the second subslot. In accordance with this example, updated input information is obtained for the input device having this subslot assignment at a rate one-half the rate that video game inputs are obtained. As can be appreciated, instead of two subslots in a slot, there could be three subslots, four subslots, and so forth. Relatedly, there can be multiple subslots, such as two subslots, during a particular interrogation or poll. One slot of the interrogation may have subslots based on a first time division of the slot and another slot might have subslots based on a different time division (e.g., $1/30$ v. $1/15$ of a second).

With respect to communications between input and output devices, as part of the communications operation, an interactive input device that will generate inputs during

operation by its user will be assigned to a certain interactive output device of the output device system by the host. Additionally, this interactive input device will be assigned a slot or subslot by the host. The host conveys such assignment information to the head end controller. The host sends out a poll to the guest terminal subsystems including a series of interactive interrogations for use in receiving input information from currently activated interactive input devices. The interactive interrogation is received by the guest terminal subsystems by means of the distribution system. For each assigned slot and/or subslot in a slot, any input present from the interactive input device having such assigned slot or subslot is provided in that time interval of the assigned slot or subslot. A response by an interactive input device, which is found in its assigned slot or subslot, is received by the host and the head end controller. The host provides a "tick" or indication to the head end controller each time input information should be received by the head end controller from a slot or subslot. That is, a tick is generated when a poll message is sent by the head end controller and, therefore, a response is expected to be received to that poll message. The head end controller correlates slot or subslot information to a particular emulation assembly and output device connected thereto. Such correlation involves providing an address for the emulation assembly, together with the input information, and outputting it to the router bus. The emulation assembly that has the address associated with the input information receives such input information at its input interface. The emulation assembly formats the input information or data so that it is acceptable to the interactive output device connected to the output interface of the emulation assembly. The interactive output device receives this current or updated input information and acts on such information just as it would if it were connected directly to its associated interactive input device. In acting on this current input information, the interactive output device functions to generate an output that is to be sent back to the particular interactive input device. Such output information or data is transmitted through a modulator and subsequently to the distribution system and then to the guest terminal subsystem having the associated interactive input device. This interactive input device can then act on or reply to the updated information received from its associated interactive output device. This process or series of steps continues as the user or player provides further inputs and acts on responses or outputs from the particular interactive output device to which is connected the interactive input device being utilized by the user.

Based on the foregoing summary, a number of salient features of the present invention can be readily recognized. A system and methodology integrate different devices including interactive devices into a system that provides information and/or entertainment. Such a system can be conveniently installed in a hotel or other lodging complex. The system facilitates interconnection of such different devices, which can be available from a number of different manufacturers, without modifications to the host hardware and software. The system is scalable in that additional devices can be incorporated relatively easily at the head end. Likewise, for environments in which fewer output devices are required, the system accommodates such a reduced number of output devices. Relatedly, the system is adaptable to changes in the number and kind of output devices. In that regard, emulation assemblies can be re-configured to properly function with a different selected output device. Furthermore, the obtaining of input information is enhanced by efficiently using system bandwidth capabilities in the form of slot/subslot arrangements when input devices are polled. The system is also designed to provide relatively more rapid replies to those inputs requiring more immediate responses, such as inputs from video games.

Additional advantages of the present invention will become readily apparent from the following discussion, particularly when taken together with the accompanying drawings.

20

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a block diagram of major subsystems or components of the present invention;

Fig. 2 illustrates a block diagram showing more details of the router apparatus;

Figs. 3A-3D illustrate timing diagrams related to obtaining input information using slots/subslots of interactive interrogations;

Fig. 4 illustrates timing diagrams related to a command message sent to an emulation assembly; and

Fig. 5 illustrates timing diagrams related to a data message to emulation assemblies.

DETAILED DESCRIPTION

With reference to Fig. 1, an entertainment and/or information system 20 is illustrated. The system 20 includes a number of guest terminal subsystems 24. Each guest terminal subsystem 24 is preferably located in a room of a hotel or other lodging complex, although such a guest terminal subsystem 24 could be provided in any kind of room. Each guest terminal subsystem 24 may have a number of entertainment and/or information accessing units including, for example, a television and/or computer/computer monitor and/or input devices including interactive devices such as: a keyboard, a mouse, a TV remote and/or a video game station. Each guest terminal subsystem 24, particularly using such units and/or devices is linked to a head end system 28 by a distribution system 32, which can be a two-way master antenna television (MATV) distribution system. The distribution system 32 comprises a coaxial cable network including amplifiers, splitters and taps in order to provide the two-way communication between the head end system 28 and the guest terminal subsystem 24.

The head end system 28 includes a diplexer 36, which enables two-way communication between the head end system 28 and the guest terminal subsystems 24 by routing a combined signal to the distribution system 32. Conversely, information or data signals from the guest terminal subsystems 24 are delivered from the distribution system 32 by the diplexer 36 to the components of the head end system 28.

The head end system 28 also includes a RF modem 40 in communication with the diplexer 36 for receiving the guest terminal information/data signals from the distribution system 32. The RF modem 40 demodulates such RF signals before passing them to other components of the head end system 28 for processing or other use. The RF modem 40 also modulates incoming signals, such as control signals from a host computer 44. The host computer 44 is responsible for overall control of the head end system 28 and has system management software controlling its performance in connection with operating the system 20. The functions and operations of the host computer 44 will be explained in greater detail later herein.

The head end system 28 also includes a router apparatus 50 for receiving inputs including interactive inputs generated by the guest terminal subsystems 24. The router apparatus 50 has major responsibilities in connection with controlling and enabling communications emanating from input devices of the guest terminal subsystems 24. The

router apparatus 50 facilitates these communications and reduces the time within which outputs responsive to inputs from the guest terminal subsystems 24 are generated and sent back to the guest terminal subsystem 24. In particular, the router apparatus 50 eliminates hand shake delays involving the host computer 44 since such inputs need no longer be routed through the host computer 44 but are handled by the router apparatus 50. Relatedly, the router apparatus 50 eliminates the handling of the input data/information by host computer 44 software, which also reduces the time involved in responding to such inputs. The router apparatus 50 also avoids use of the communication path, which is typically an Ethernet path, that has previously been relied on in sending data. Instead, such an Ethernet path is only used for control information between the host computer 44 and the guest terminal subsystems 24, not for purposes of handling data associated with the input devices, such as keystroke data from a keyboard of a guest terminal subsystem 24. The router apparatus 50 controls and prepares the inputs it receives for application to an output device system 54. The output device system 54 comprises a number of output devices including interactive output devices. When an operation, which is associated with a particular input device is initiated, the router apparatus 50 is used to provide inputs from that particular associated input device of a guest terminal subsystem 24 to the corresponding or associated output device of the output device system 54. Generally, when a particular input device of a guest terminal subsystem 24 has been selected or enabled by user, the host computer 44 establishes a communication link between that particular input device and the associated output device that the user wishes to interact with or otherwise utilize.

Outputs from each of the output devices of the output device system 54 are transmitted to a corresponding one of a number of RF modulators 58. Each RF modulator frequency translates the received signal and provides the translated signal to a combiner 62. The combiner 62 additively combines each of the RF signals into a single complex signal and provides this combined signal to the diplexer 36. The diplexer 36 applies such signals from one or more of the output devices of the output device system to the proper guest terminal subsystem input device by means of the diplexer 36 and through the distribution system 32. Accordingly, output device signals in response to inputs from the activated input devices of guest terminal subsystems 24, are provided to the appropriate receiving unit, such as the television or computer monitor. Each such output device signal

may result in additional interactivity involving the user at an enabled guest terminal subsystem 24.

With reference to Fig. 2, more detailed descriptions are next provided, particularly directed to the router apparatus 50, the host computer 44, together with the communications between the router apparatus 50 and the output devices of the output device system 54. As seen in Fig. 2, the host computer includes a central processing unit (CPU) 70 that is linked to an intelligent communications processor (ICP) 74. The CPU 70 controls or executes a management system including programmable applications software located in memory, such as a hard disk drive. Such a management system manages the system 20 utilizing the ICP 74. The CPU 70 preferably operates under the control of the UNIX operating system. The intelligent communications processor 74 has an asynchronous receiver/transmitter (UART) and provides a communications link between the CPU 70 and the guest terminal subsystems 24. The ICP 74 generates, under control of the CPU 70, both system interrogations and interactive, including game, interrogations. The ICP 74 receives the interrogation responses from the guest terminal subsystems 24 and informs the CPU 70 when there is a change in status associated with a guest terminal subsystem 24. The interactive interrogations and responses thereto relate to the communications between interactive input devices of the guest terminal subsystem 24 and interactive output devices of the output device system 54. The system interrogations relate to communications between the host computer 44 and the guest terminal subsystem 24 involving overall system control and operations, such as checking for menu-related inputs from the guest terminal subsystem so that appropriate actions or responses can be taken by the host computer 44. The ICP 74 is electrically connected to the RF modem 40. The transmitter assembly thereof converts ICP polling data (system and/or interactive interrogations), which is sent to the guest terminal subsystems 24, from a digital signal to a RF signal that can be transmitted through the distribution system 32 to the guest terminal subsystems 24. The receiver assembly of the RF modem 40 receives RF data coming from the guest terminal subsystems 24 and converts the digital signals for processing by the router apparatus 50. In one embodiment, the RF modem 40 uses a 50 MHz transmitter and a 22 Mhz receiver. Each of these two assemblies is shielded to avoid any digital interference that might degrade the RF modem performance. The host

computer 44 and the RF modem 40 preferably communicate with each other through a RS-232 interface.

5 The router apparatus 50 includes a head end controller or router control board 80 that includes a router CPU, which is responsible for controlling interactive inputs received from the guest terminal subsystems 24. The hardware and software of the router control board 80 formats such inputs into standard hardware inputs acceptable to the emulation assemblies 100. In that regard, the router control board 80 is also responsible for insuring that such data is addressed to the proper emulation assembly 100 for output to the proper interactive output device of the output device system 54. The router apparatus 50 is configured to enhance scalability whereby additional and/or new third party interactive output devices can be readily added or incorporated into the output device system 54. The router apparatus 50 also provides the inputs to such output devices with minimal latency since such inputs need not be processed or otherwise handled by the host computer 44. The router apparatus 50 also includes a universal power supply 84 that can be used internationally. The power supply 84 includes a power cord interface that can be used to support various international power plug ins.

20 The router control board 80 communicates with the emulation assembly 100 through asynchronous serial peripheral interface (SPI) or router bus. The SPI includes a slave select line, a data line and a clock line. When data is to be sent to the emulation assemblies 100, the slave select line is controlled or changed to indicate that data is to be sent. The data is sent over the data line in accordance with a predetermined state or polarity of the clock line.

25 The router apparatus 54 also includes a number of emulation assemblies or boards 100 that provide the proper communication links between the interactive output devices of the output device system 54 and the input data from the SPI 88. The emulation assembly or device emulation board 100 is dedicated to a particular interactive output device 110 of the output device system 54. Each emulation assembly 100 is able to support at least the following standard serial physical interfaces, with a logical application being behind each such physical interface:

Physical InterfaceLogical Application

Asynchronous RS-485

Video game engine

Asynchronous RS-232

Serial mouse

5

Asynchronous TTL

AT keyboard

In one embodiment, the emulation assemblies 100 are configured when they are manufactured and/or assembled, and before installation at a particular site or ultimate destination. In another embodiment, the emulation assemblies 100 can also be configured or re-configured using the host computer 44. Each emulation assembly 100 also
 10 incorporates reprogrammable hardware that allows it to be upgraded to support other logical applications using the associated physical protocols. This modular design of the router apparatus 54 enables other emulation assemblies to be developed and added later to the system 20 for supporting other types of physical protocols.

With respect to interactive interrogations and responses thereto, each guest
 15 terminal subsystem 24 that has requested a particular interactive output device 110 is instructed concerning the identification of a polling slot assignment. The particular interactive input device 114 of a guest terminal subsystem 24, through its request, is slaved to an appropriate interactive channel that includes the particular interactive output device 110 that it wishes to access or use. In one embodiment, the ICP 74 transmits a
 20 multiplexed poll approximately every 1/60th of a second. All guest terminal subsystems 24 receive this poll. However, only those with slot assignments provide a response. In that regard, each guest terminal subsystem 24 including any enabled interactive input device 114 receives the poll and waits for special RSVP characters (e.g. \$F1). The guest terminal subsystem 24 that is assigned to slot 1 of the multiplexed poll responds after receiving the first RSVP. The guest terminal subsystem 24 assigned to the second slot of
 25 the multiplexed poll responds after the second RSVP and so forth. This polling methodology at a predetermined time of 1/60th of a second has particular utility where the combination of the interactive output device 110 and the interactive output device 114 involves relatively fast input times and, therefore, requires relatively faster outputs from
 30 the interactive output device 110 to the interactive input device 114. For example, video games ("twitch" games) require rates at or near the 60 times per second. On the other hand, other applications, such as use of an Internet browser, require lower polling rates.

Based on this requirement, one or more additional levels of multiplexing are included to avoid wasting the communications bandwidth due to excessive polling of the guest terminal subsystems 24, which have enabled interactive input devices 114 with relatively slower input rates. To handle these interactive input device and interactive output device combinations, one or more subdivisions of the predetermined time slot is employed. By way of example, the 1/60th of a second time slot is divided into subslots based on a power of two. In one example, each time slot can be subdivided by four so that a particular slot has four subslots. In implementing such subdivision, the ICP 74 is instructed by the host computer 44 to serialize the outbound multiplexed poll packet based on the subdivision, such as a subdivision by four. For those guest terminal subsystems 24 associated with a lower order or less rapid response time interactive application, they are assigned subslots in addition to their slot assignment when slaved to a particular interactive output device 110. Such guest terminal subsystems 24 having subslot assignments process the multiplexed poll and prepare a response only when their subslot assignment matches the outbound multiplex poll. As an example of slotted and subslotted polling in the context of three different guest terminal subsystems 24 responding to a multiplexed poll, reference is made to Fig. 3. In this example, a first guest terminal subsystem 24 has player 1 playing a video game using interactive input device 114a and interactive output device 110a. An interactive user 1 at another guest terminal subsystem 24 is using interactive input device 114b in communicating with an interactive output device 110b. Such an interactive output device 110b might include an Internet browser. Interactive user 2 is using interactive input device 114c at still another guest terminal subsystem 24c. This interactive input device 114c is slaved to interactive output device 110c. The interactive output device 110c might also be an Internet browser.

A multiplexed poll, as illustrated in Fig. 3A, is transmitted by the ICP 74 through the distribution system 32 to the guest terminal subsystems 24. The multiplexed poll is comprised of a number of slots, such as slot 0 and slot 1. Each of the slots has at least two subslots. Fig. 3B illustrates player 1 providing response data in the assigned slot 0. Interactive user 1 provides response data in subslot 1 of slot 1, as illustrated in Fig. 3C. Interactive user 2 provides response data in subslot 2 of slot 1, as illustrated in Fig. 3D. This means that during one poll, such as a first poll, interactive user 2 does not provide any data since interactive user 1 is using that slot at that particular time period. By way

of further example, if the poll is sent 60 times per second, then player 1 responds 60 times per second using slot 0. Further assuming a subdivision of four of the subslotted slots, interactive user 1 responds in the first subslot of slot 1 and would respond $60/4$ or 15 times per second. Likewise, interactive user 2 responds during slot 1 at $60/4$ or 15 times per second, but at different 15 times per second intervals than interactive user 1.

Returning to Fig. 2, a further description of each emulator assembly is provided. Each device emulation board 100 replaces an input device that is part of an interactive or other user enabled system. Such input devices can include a keyboard or mouse used with a personal computer (PC), a game controller used with a video gaming console, or a stream of serial data to any interactive device or group of interactive devices. Each emulation assembly 100 is able to support RS-485, RS-422, RS-232 and TTL type data transmissions. TTL can be used to support keyboard emulations. RS-232 can be used if a mouse or some other serial port interactive device is used. RS-485 can be used with a gaming console, for example. In one embodiment, the type of transmission from the output of a particular emulation assembly 100 could be set and changed through a menu on the host computer 44. Each transmission type requires a specific wire harness so that the proper output signals from the particular emulation assembly 100 can be properly provided to the selected interactive output device 110. In one embodiment, the router apparatus 50 has five device emulation boards 100, with each having two outputs. The firmware for the device emulation boards 100 is loaded at the time of manufacture. Each device emulation board 100 is configured with the correct data transmission type and has the correct wire harness installed during manufacturing of the system 20. All of the emulation assemblies 100 are daisy chained together by a wire harness that will carry the SPI or router bus 88 and power from the power supply 84 to each of the emulation assemblies 100. The following chart identifies the signal and number of conductors used by such different data transmission types:

	RS-485	RS-422	RS-232	TTL	
Signals:	diff. A	diff. A	data out	data out	
	diff. B	diff. B	data in	data in	
	(Txd)*	(Rxd)*		clk	
Number of conductors	2	2	2	3	Gnd
Min. Required conductors	10				

It should be noted that the RS-422 uses the RS-485 lines for transmit and RS-422 line as a receive for full duplex.

In conjunction with the router control board 80 receiving input data from the guest terminal subsystems 24 and providing it to the emulation assemblies 100, when an interactive session occurs that involves one or more interactive output devices 110, the host computer 44 notifies the router control board 80 regarding which interactive output device 110 is to be used and its poll slot or subslot assignment for the guest terminal subsystem 24 including its interactive input device 114. The router control board 80, particularly its CPU, monitors outbound poll messages from the ICP 74 and waits for the returned multiplexed poll. In connection with notification of transmission of a RSVP character, the router control board 80 receives a notification input or "tick" from the ICP 74 for each guest terminal subsystem 24 that is expected to respond to the interactive interrogation or poll. The tick informs the router control board 80 as to when to expect a response from each applicable guest terminal subsystem 24. Upon receipt of such data, the router control board 80 checks to determine if the data is valid. The valid data is then sent out to the correct emulation assembly 100 using the SPI bus 88. In that regard, each emulation assembly 100 is assigned an address on the SPI 88 so that the router control board 80 can send the data to the correct location or entity on the router bus 88. The emulation assembly 100 receives such data at its input interface. The particular emulation assembly 100, particularly its CPU, processes the data and sends it from its output interface to its associated or connected interactive output device 110 in the correct data format and proper transmission type.

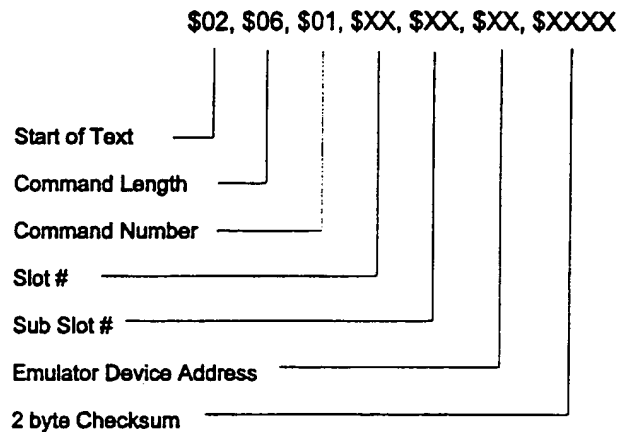
With respect to further information concerning the processing and operation of the router control board 80, when returned poll data is received, it switches control circuitry so that its UART is connected to the return data path from the guest terminal subsystems

24. The poll message includes a data byte indicating this poll's subslot number. The CPU of the router control board 80 includes memory for storing an internal look up table of slot, subslot and output device assignments. This table is built based on data received from the host computer 44 via the serial control link. The router control board 80 reads the data returned from the guest terminal subsystems 24 and accesses the table in memory in determining where the data is to be sent. The router control board 80 changes the state of the slave select line, such as to a binary zero. It then sends a byte indicating the output device address (which has a corresponding emulation assembly 100), followed by four bytes of data and a checksum. This data is sent to the emulation assemblies 100 by means of the SPI 88. The emulation assemblies 100 are triggered by the falling of the slave select line. Each of the emulation assemblies 100 checks the first byte to determine if the address therein matches its hardware placement address. If there is no match, each such emulation assembly 100 counts four more bytes received and again checks the address. If any of the addresses match a particular emulation assembly 100, it continues to read and store the next four bytes and processes the data into the output that is required for its connected or corresponding output device 110. Further descriptions related to such processing and communications will be provided later herein.

In a preferred embodiment, the router apparatus 50 also includes a bus expansion board 120. The bus expansion board is connected to the SPI 88. The bus expansion board 120 adds more outputs to the router apparatus 50 and allows more output devices to be installed at the head end of the system 20. Specifically, the bus expansion board 120 is electrically connected to a modified or limited capability router subassembly 130. The router subassembly 130 has a bus expansion board receiver 134, a power supply 138, and a number of emulation assemblies or device emulation boards 142 that communicate with the bus expansion receiver 134 through a separate SPI 146. The router subassembly 130 does not include a router control board or any hardware comparable thereto. The number of bus expansion boards 120, together with associated router subassemblies 130, can be added as part of the system 20 until the required polling associated with such emulation assemblies 100 and corresponding output devices 110 results in unwanted slowing down or inefficiencies in completing other host computer functions.

Additional descriptions are now provided related to communications involving the hardware of Fig. 2. The router apparatus 50, by means of the router control board 80, has

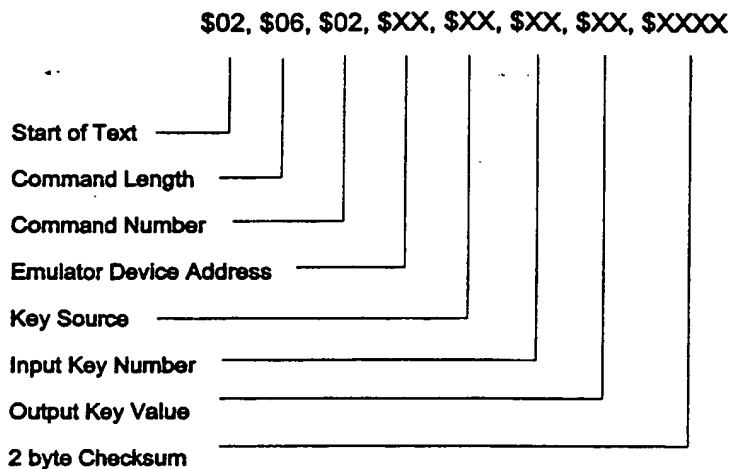
only one command that originates from it to the host computer 44. This command is identified as an initialize request command. This command informs the host that it needs to have route assignments initialized, with such routes related to establishing the correspondence or assignment between each input device 114 of a guest terminal subsystem 24 and a particular output device 110 of the output device system 54. The host computer 44 invokes a number of commands to the router apparatus 50. The host computer 44 utilizes an input router command such as a keystroke input provided by a particular interactive input device 114. This command instructs the router control board 80 as to the identification of each emulation assembly 100 that is to receive a response to the interactive interrogation or polling. This enables the router control board 80 to be aware of the identity of the emulation assembly 100 to which a particular response must be sent. This command is configured as follows:



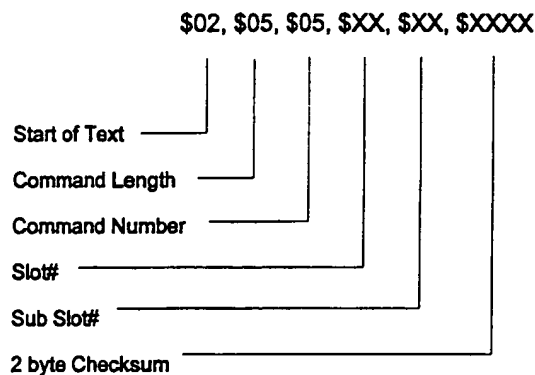
If this command is successfully received, the router control board 80 responds with an acknowledge designation. If the router control board 80 does not successfully receive the command within a certain period of time, the host computer 44 retries the command. A subslot assignment of zero indicates the emulation assembly being addressed is communicating with a non-subslotted device, e.g., a video game device or engine.

Another host computer 44 command to the router apparatus 50 is an emulation assembly key map command by which the addressed emulation assembly 100 is

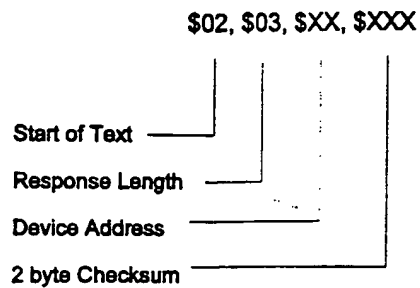
instructed to set up/change its key maps. The data packet for such a command is arranged as follows:



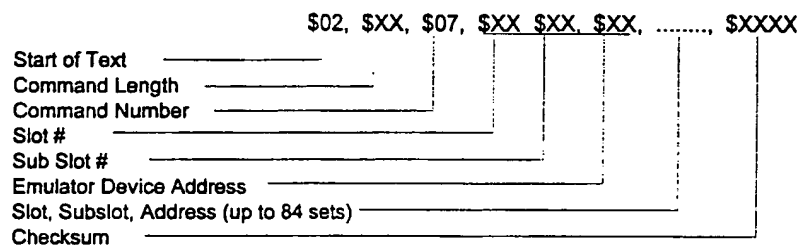
- The host computer 44 also has an assignment query command directed to the router apparatus 50. The host computer 44 uses this command to determine the identity of the emulation assembly 100 that is assigned to a given slot and/or subslot. This command is identified as follows:



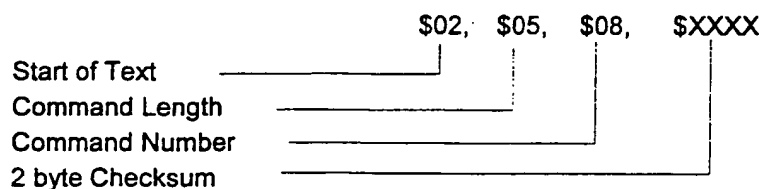
- If this command is successfully received, the router control board 80 responds with the following:



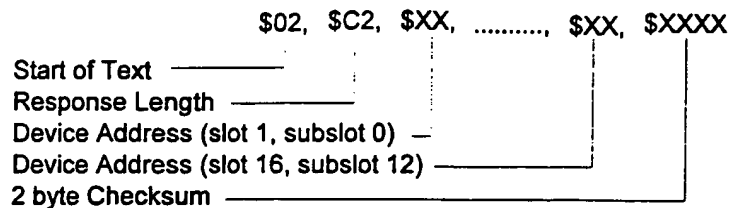
Still another command from the host computer 44 to the router apparatus 50 can be defined as a multiple route command. This command is similar to the input route command involving a single route assignment, but differs in that this command instructs the router control board 80 regarding multiple route assignments that, in one embodiment, can include a maximum of 84 sets. This multiple route command is formed by the following information packet:



A further host computer 44 command to the router apparatus 50 is a query route table command. The host computer uses this command to obtain the current information regarding the makeup of the route table. In one embodiment, the route table of the router control board 80 is 16 slots x 12 subslots deep. This command is configured as follows:



If the command is successfully received, the router control board 80 responds with the following:



Additional host computer 44 commands include: a router control board 80
 5 firmware version and revision command that the host computer 44 uses to find out the
 firmware version and revision of the router control board 80; an emulation assembly 100
 firmware version and revision command so that the host can obtain a single emulation
 assembly's firmware version and revision; and a system check command that the host can
 use to determine if the router apparatus 50 has detected any hardware errors.

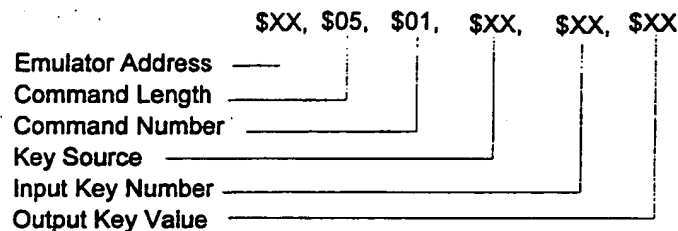
10 The next set of communications to be described relate to those from the router
 control board 80 to the emulation assemblies 100. The CPU of the router control board
 80 communicates with the CPU of the emulation assembly 100 via the synchronized SPI
 or router bus 88. The router control board 80 initiates all communications and controls
 the data transmissions to the emulation assemblies. The communication is started by the
 15 CPU of the router control board 80 changing the state to a logic zero, or pulling down, the
 slave select line. This indicates to the emulation assembly 100 that it will receive a
 message. There are two types of messages that the router control board 80 sends to the
 emulation assemblies 100. The first is a command type of message and the second is an
 input data stream message. The router control board 80 indicates the message type by the
 20 level of the data line when the slave select line is pulled down.

Regarding the command type message, it is a message addressed to a single
 emulation assembly 100 and requires a data message response to be sent back to the router
 control board 80. These messages include downloading of key maps and version/revision
 and responses. With reference to Fig. 4, a command message begins when the router
 25 control board 80 holds its data out line to ground while bringing the slave select line to
 ground. After a predetermined time interval, the router control board 80 sends out the

command packet. All SPI 88 transfers are accomplished with the clock polarity (CPOL) equal to one and the clock phase (CPHA) equal to one (i.e. CPOL = 1, CPHA = 1). The router control board 80 allows the emulation assembly 100 to process the command and in a predetermined time interval, the router control board 80 clocks the response back.

5 This response depends on the outbound command. Upon completion, the router control board 80 brings the slave select line back high, thereby indicating the end of the command, as further illustrated in Fig. 4.

With respect to a key map command that can be sent by the router control board 80, an addressed emulation assembly 100 can be instructed to set up/change its key map by means of the following configured command:



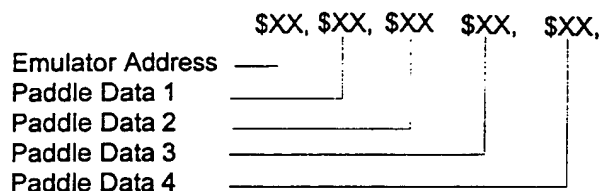
Other commands to particular addressed emulation assemblies 100 include a version and revision command by which the host computer 44 determines the addressed emulation assemblies firmware version and revision and a report error(s) command by which the host computer 44 can query the identified emulator assembly 100 for any errors.

Referring next to data messages to the emulation assemblies 100, such a message stream contains input data received from the guest terminal subsystems 24. An input data message begins with the router control board 80 holding its data out line high (logical one state) while bringing the slave select line to ground. After a predetermined time, the router control board 80 sends out the input data message stream. The SPI 88 transfers are done with the clock polarity (CPOL) equal to 1 and the clock phase (CPHA) equal to one (CPOL = 1, CPHA = 1). The input data stream has groups of five bytes of data. These five bytes of data are the address of the emulation assembly 100 being accessed followed by four bytes of input data that are returned from the particular guest terminal subsystem 24. The number of five byte groups will depend on the number of slots associated with the multiplexed polling. For example, an emulation assembly 100 connected to or

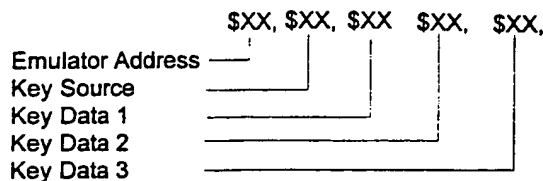
associated with a particular video game output device monitors all packets from the router control board 80 to determine whether or not its address is present, since it may expect multiple player responses. In such an embodiment, for each slot of the multiplexed poll that is not addressed to such emulation assembly 100, it sends idle characters to the output device. Each of the other emulation assemblies 100 assumes only one packet per packet stream and stops monitoring the incoming data after it receives its addressed data. After completion of a particular packet data stream, the router control board 80 brings the slave select line back high thereby indicating the end of this particular data stream, as illustrated in Fig 5.

With regard to more information concerning input data packet streams, they consist of multiple input data packets. The number of packets depends upon the number of multiplexed poll slots. Each packet includes an emulation assembly address byte followed by four bytes of input data. The input data contents are dependent on the type of interactive input device 14 of the guest terminal subsystem 24 that is responding. In one embodiment, there are two types of input data, namely, game play input packet data and subslotted input packet data.

The first embodiment is in response from a non-subslotted terminal. This response is typically intended for the "twitch" game play and contains a mask of the key positions:



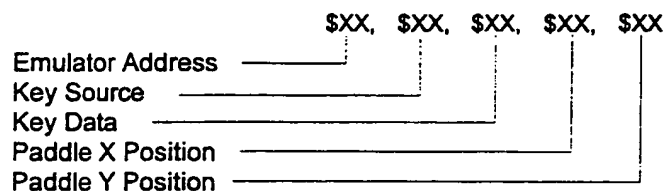
In a second embodiment, the terminal has a subslot assignment that indicates a lower level polling. The terminal will compare the address byte 3 to its assigned subslot poll. If they match the terminal will respond with the following:



The key source field indicates the in-room device from which the key data originates. The current key sources are:

- 1 = Local Keypad
- 2 = Standard remote
- 5 3 = Maid Remote
- 4 = Technician Remote
- 5 = Maid Remote
- 6 = Game Paddle
- 7 = IR keyboard

- 10 Referring now to subslotted input packet data, such a data packet is provided by a guest terminal subsystem 24 having a subslot assignment associated with its interactive input device 114. The subslot assignment indicates lower level polling. Such a guest terminal subsystem 24 provides input data packet that results in the following being sent to the particular emulation assembly 100 by the router control board 80:



- 15 The key source field indicates the interactive input device 114 from which the input data originates. In one embodiment, such input sources can be identified as: local keypad, standard remote, maid remote, technical remote, game panel and IR (infrared) keyboard.

- Data results are sent from the emulation assemblies 100 to the output devices 110. In particular, each active output device 110 receives a data packet from its associated emulation assembly 100 to which it is connected or dedicated. Such data is in the form of data signals that are acceptable to or compatible with the particular output device 110. The output data packet from the emulation assembly 100 to which the output device 110 is connected is equivalent to that packet required by the particular output device 110, if this particular output device 110 were directly connected to its associated interactive input device 114, and not indirectly connected by means of the distribution system 32, as well as the router control board 80 and the associated emulation assembly 100.

One example of an interactive output device 110 is one that accepts PC/AT keyboard scan codes. The emulation assembly 100 that is associated or connected to this

interactive output device 110 has tables to translate keys received from the particular guest terminal subsystem 24 into the keyboard scan codes. Such an emulator assembly 100 will have the capability to remap keys as needed or desired.

Further communications to be discussed relate to those from the host computer 44 to the ICP 74 and to the guest terminal subsystems 24. One such communication to the ICP 74 is a command from the CPU 70 of the host computer 44 to initiate a high speed multiplexed interactive polling or interrogation. This command takes affect only if the ICP 74 is currently in the standard polling state (system interrogation) or can be used to change the number of slots and/or subslots. This command packet can be identified by the following fields and information:

0 - 1	0	11	Packet Length
2	11		Class & Command (00 / 17)
3	0		Command Indicators
4	0		Spare
5 - 11	0	0	N/A
12 - 13	0	0	Error Code/Number
14 - 15	#	#	N/A
16	#		Number of Slots
17	#		Number of Subslots

In one embodiment, the number of slots is the number of 1/60th of a second slots in the multiplexed poll. The number of subslots indicates two levels of subslotting. The upper nibble indicates the number of level A subslots (which corresponds to the number of devices in that subslot) and the lower nibble indicates the number of level B subslots (which corresponds to the number of devices in that particular subslot).

The host computer 44 also communicates with guest terminal subsystem 24 that include a television. The host computer 44 utilizes a write TV control command. In connection with subslotted polling, such a command includes a data byte that contains the guest terminal subsystem 24 subslot assignment for the guest terminal subsystem 24 having the particular television.

A further aspect of the router apparatus embodiment relates to the manner by which the ICP 74 communicates with the guest terminal subsystems 24. In particular,

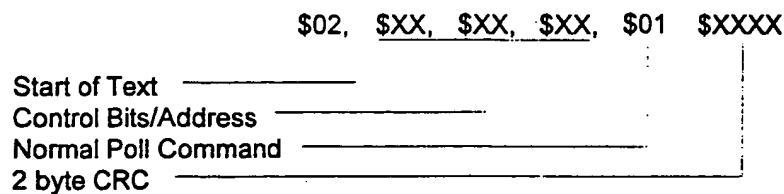
such a communication includes an address of the guest terminal subsystem 24 to which the particular communication is directed. As part of this form of communication, the CPU 70 of the host computer uses a registered guest terminal address command to instruct the ICP 74 regarding the identities of the guest terminal subsystems 24 that are to be
 5 polled. Once the ICP 74 receives this command, it switches to poll by address protocol. More specifically, this command is sent to the ICP 74 to register the guest terminal subsystem address into the ICP internal polling table. Such a command packet is configured by the following command packet fields:

10	0 - 1	0	13	Packet Length
	2	14		Class & Command (00 / 20)
	3	0		Command Indicators
	4	0		Spare
	5 - 11	0 0		N/A
	12 - 13	#	#	Error Code/Number
15	14 - 15	#	#	GT Polling/System Index
	16 - 18	#		Guest Terminal Address

With regard to further information concerning the interactive polling using guest terminal subsystem addressing, such a guest terminal subsystem address consists of a two bit control field and a 22 bit terminal address field. The control field of two bytes constitutes
 20 the most significant bits of the guest terminal subsystem address. A 0 in the most significant bit indicates that the terminal address field contains a terminal address. A 1 in the most significant bit indicates that the terminal address field contains a global address. The second most significant bit depends on whether the message is a command to the guest terminal subsystem 24 to perform a task or if the message is a poll requesting
 25 information from the guest terminal subsystem 24. The guest terminal subsystem 24 can determine a command from a poll by the most significant bit of the command field. If the message is a poll, this bit is zero when the data from the last poll was not received and is a one if the data from the last poll was received. If the message is a command, then this bit is zero if the command does not need to be acknowledged by the guest terminal
 30 subsystem 24, while a one indicates that the command is to be acknowledged.

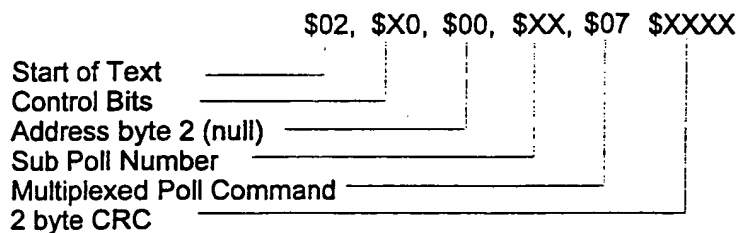
The terminal address field is 22 bits in length with a maximum polling address capability of 4,194,303. The first type of address is terminal specific and is identified using the control fields. The second type of address is global and is defined using the same control field. When the message is global, the terminal address field may contain further addressing. In the case of multiplexed subslotted polling, this field may contain a subpoll number that provides an indication as to which interactive input devices 114 are to respond to this particular poll.

The ICP 74 transmits a standard or system poll or interrogation to each guest terminal subsystem 24. In one embodiment, such a poll packet is defined as follows:



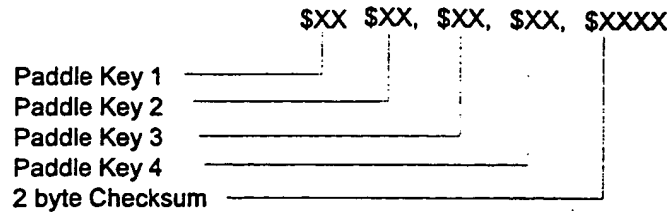
10 A guest terminal subsystem 24 receiving such a poll responds with either a simple acknowledge, if nothing has changed within the guest terminal subsystem 24 since the last poll. If a change has occurred, this guest terminal subsystem 24 responds with a standard poll response.

15 The ICP 74 also transmits the multiplexed subslotted poll (interactive interrogation) to the guest terminal subsystems 24. Such a poll packet can be defined by the following fields and identified information:

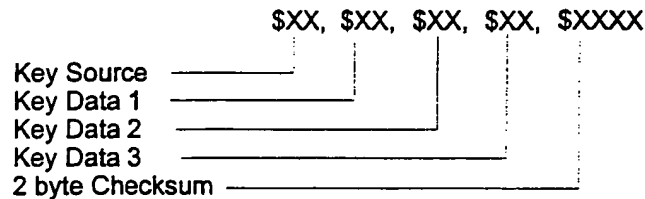


20 The subpoll number indicates the identity of the subslot for which this particular poll is seeking any current input. The upper nibble indicates a level A subslot poll number, while the lower nibble indicates a level B subslot poll number. All guest terminal subsystems 24 process such a poll command. However, only certain guest terminal subsystems 24 that have multiplexed slot indexes assigned respond to such a poll command. The response differs slightly if the guest terminal subsystem 24 has also been assigned a subslot index.

In an example in which the interactive input device 114 of the particular guest terminal subsystem 24 being polled does not have a subslot index, a guest terminal subsystem 24 having this active input device 114 responds with the following packet during its assigned time slot:



- 5 In another example in which the guest terminal subsystem 24 does have a subslot assignment that indicates a lower level polling, this guest terminal subsystem 24 compares the address byte 3 to its assigned subslot poll. When they match, this guest terminal subsystem 24 responds with a data packet identified by the following fields:



- 10 The key source field indicates the guest terminal subsystem interactive input device 114 from which the input data originates. Current input sources are identified as: local keypad, standard remote, maid remote, technician remote, game paddle and IR (infrared) keyboard.

- 15 The following data packet is sent to the game array via a RS-485 interface. For each multiplexed poll a 2 byte start header is sent followed by the following data packet(s). If the device address of the slot does not match the game emulator device slot then a idle data packet must be sent to the game array. This maintains slot assignment of the game engines.

\$XX \$XX, \$XX, \$XX, \$XX

Key Data 1	_____
Key Data 2	_____
Key Data 3	_____
Key Data 4	_____
Key Data 5	_____

The foregoing description of the present invention has been presented for purposes of illustration and description. Furthermore, the description is not intended to limit the invention to the form disclosed herein. Consequently, variations and modifications commensurate with the above teachings, and the skill or knowledge of the relevant art, are within the scope of the present invention. The embodiments described hereinabove are further intended to explain best modes known for practicing the invention and to enable others skilled in the art to utilize the invention in such, or other, embodiments and with various modifications required by the particular applications or uses of the present invention. It is intended that the appended claims be construed to include alternative embodiments to the extent permitted by the prior art.

What is claimed is:

1. An entertainment system for use with a plurality of rooms, comprising:
a plurality of guest terminal subsystems that include a plurality of interactive input
devices comprising at least first and second interactive input devices that are different
5 from each other;
a head end system including router means and a plurality of interactive output
devices, said router means including a plurality of emulation assemblies comprising at
least first and second emulation assemblies, each of said emulation assemblies having an
input interface and an output interface, said input interface of said first emulation
10 assembly being responsive to said first interactive input device but not being responsive
to said second interactive input device, said input interface of said second emulation
assembly being responsive to said second interactive input device but not being
responsive to said first interactive input device, said router means also including a
common interface electrically connected to each of said input interfaces of said plurality
15 of emulation assemblies; and
a distribution system electrically connected to said plurality of guest terminal
subsystems and said head end system.
2. An entertainment system, as claimed in Claim 1, wherein:
said router means includes a head end controller for sending input information
20 generated by said first and second interactive input devices to said common interface.
3. An entertainment system, as claimed in Claim 2, wherein:
said head end system includes a host different from, but in communication with,
said head end controller.
4. An entertainment system, as claimed in Claim 3, wherein:
25 said host is responsive to a first guest terminal subsystem of said plurality of guest
terminal subsystems for assigning a first interactive output device of said plurality of
interactive output devices to said first interactive input device, said host providing
command information to said head end controller related to said assigning.
5. An entertainment system, as claimed in Claim 1, wherein:
30 one or more of said emulation assemblies support at least one of the following
physical interfaces: asynchronous RS-485, asynchronous RS-232, and synchronous TTL.
6. An entertainment system, as claimed in Claim 1, wherein:
said plurality of guest terminal subsystems includes a first guest terminal
subsystem having said first interactive input device, said first guest terminal subsystem

including a television and a remote for communicating with said television, said remote providing inputs transmitted to a host of said head end system.

7. An entertainment system, as claimed in Claim 1, wherein:

5 said head end system includes a host for providing system interrogations and interactive interrogations to said plurality of guest terminal subsystems, said plurality of guest terminal subsystems including first and second guest terminal subsystems, said first guest terminal subsystem responding to a first set of said interactive interrogations and said second guest terminal subsystem responding to a second set of said interactive interrogations, said first guest terminal subsystem responding to said first set of said
10 interactive interrogations by sending input information using said distribution system at a first transmission rate and said second guest terminal subsystem responding to said second set of interactive interrogations by sending input information using said distribution system at a second transmission rate, said first transmission rate being greater than said second transmission rate.

15 8. An entertainment system, as claimed in Claim 7, wherein:

said first set of interactive interrogations includes said second set of interactive interrogations.

9. An entertainment system, as claimed in Claim 1, wherein:

20 said router means includes a head end controller and a memory, said memory storing correlation information associating at least said first interactive input device with said first interactive output device, wherein said head end controller controls sending of input information to said first interactive output device via said common interface using an address of said first interactive output device.

10. An entertainment system, as claimed in Claim 1, wherein:

25 at least said first emulation assembly is configured using said head end system to be responsive to said first interactive input device.

11. An entertainment system, as claimed in Claim 1, wherein:

said first emulation assembly translates input information from said common interface to input interactive signals compatible with said first interactive output device.

30 12. An entertainment system for use in a plurality of rooms, comprising:

a plurality of guest terminal subsystems that includes a plurality of interactive input devices comprising at least first and second interactive input devices that are different from each other;

a head end system including a host, a head end controller, memory in communication with said head end controller and at least first and second interactive output devices, wherein said host provides command information to said head end controller related to an assignment of said first interactive input device to said first interactive device and said head end controller stores correlation information related to said assignment in said memory and, when said head end controller receives input information for said first interactive output device, said head end controller accesses said memory to obtain said correlation information and uses said correlation information to send said input information to said first interactive output device.

10 13. An entertainment system, as claimed in Claim 12, wherein:

said head end system includes a common interface disposed between said head end controller and said first interactive output device and in which said common interface transmits address information related to said first interactive output device.

 14. An entertainment system, as claimed in Claim 12, wherein:

15 said head end system includes at least first and second emulation assemblies with each having an input interface and an output interface, with said input interfaces being in communication with said head end controller and said output interfaces being in communication with at least one of said first and second interactive output devices.

 15. An entertainment system, as claimed in Claim 12, wherein:

20 said host provides system interrogations and interactive interrogations to said plurality of guest terminal subsystems, said plurality of guest terminal subsystems including at least a first guest terminal subsystem and a second guest terminal subsystem, said first guest terminal subsystem providing input information in response to said first set of said interactive interrogations and said second guest terminal subsystem providing
25 input information in response to said second set of interactive interrogations, said input information responding to said first set of said interactive interrogations being sent using said distribution system at a first transmission rate and said input information responding to said second set of said interactive interrogations being sent using said distribution system at a second transmission rate and in which said first transmission rate is greater
30 than said second transmission rate.

 16. An entertainment system for use in a plurality of rooms, comprising:

a plurality of guest terminal subsystems that include a plurality of interactive input devices comprising at least first and second interactive input devices that are different from each other:

a distribution system in communication with said plurality of guest terminal subsystems; and

a head end system in communication with said distribution system for sending output information and receiving input information relative to said plurality of guest terminal subsystems, said head end system including router means and a plurality of interactive output devices including at least first and second interactive output devices, said first interactive output device being responsive to said interactive input device but not being responsive to said second interactive input device, said second interactive output device being responsive to said second interactive input device but not being responsive to said first interactive input device, said plurality of interactive input devices constituting all of said interactive input devices in the entertainment system and said plurality of interactive output devices constituting all of said interactive output devices in the entertainment system, said all interactive input devices being greater in number than the number of said all interactive output devices, each of said output interfaces of said first and second interactive input devices providing input information that communicates with said router means, said first interactive input device also being able to properly function with said first interactive output device when connected thereto independently of said distribution system and said communication means and said second interactive input device also being able to properly function with said second interactive output device when connected thereto independently of said distribution system and said communication means.

17. An entertainment system, as claimed in Claim 16, wherein:

said router means includes a plurality of emulation assemblies including first and second emulation assemblies, said first emulation assembly being configured to respond to said input information from said first interactive input device but not respond to input information from said second interactive input device, said second emulation assembly being configured to respond to said second interactive input device but not respond to said first interactive input device.

18. An apparatus, as claimed in Claim 17, wherein;

said router means includes a common interface and each of said interactive output devices includes an input interface and in which said common interface communicates with each of said input interfaces.

19. An entertainment system, as claimed in Claim 18, wherein:

said router means includes a head end controller that provides said input information from each of said first and second interactive input devices to said common interface.

5 20. An entertainment system, as claimed in Claim 19, wherein:

said head end system includes a host that provides command information to said head end controller related to an assignment of said first interactive input device for providing said input information to said first interactive device.

21. An entertainment system, as claimed in Claim 16, wherein:

10 said head end system includes a host for providing system interrogations and interactive interrogations to said plurality of guest terminal subsystems, said plurality of guest terminal subsystems including a first guest terminal subsystem and a second guest terminal subsystem, said first guest terminal subsystem responding to a first set of said interactive interrogations and second guest terminal subsystem responding to a second set
15 of said interactive interrogations, said first guest terminal subsystem providing first input information in response to said first set of said interactive interrogations and said first input information being sent using said distribution system at a first transmission rate, said second guest terminal subsystem providing second input information in response to said second set of said interactive interrogations and said second input information being sent
20 using said distribution system at a second transmission rate, with said first transmission rate being greater than said second transmission rate.

22. A method for obtaining information in an entertainment system that includes a plurality of guest terminal subsystems including at least first and second guest terminal subsystems, comprising:

25 providing system interrogations and interactive interrogations, including at least first and second interactive interrogations, to at least said first and second guest terminal subsystems;

sending first input information from said first guest terminal subsystem at a first transmission rate in response to said interactive interrogations; and

30 sending second input information from said second guest terminal subsystem at a second transmission rate in response to said interactive interrogations, said first transmission rate being greater than said second transmission rate.

23. A method, as claimed in Claim 22, wherein:

said sending first input information includes sending said first input information in response to said first interactive interrogation and in response to said second interactive interrogation, said sending second input information step including sending said second
5 input information in response to said second interactive interrogation but not sending second input information in response to said second interactive interrogation.

24. A method, as claimed in Claim 23, wherein:

said interactive interrogations including a third interactive interrogation and said method includes sending third input information from a third guest terminal subsystem
10 in response to said second interactive interrogation.

25. A method, as claimed in Claim 22, wherein:

said first transmission rate is about $1/60^{\text{th}}$ of a second and said second transmission rate is a multiple of said first transmission rate.

26. A method, as claimed in Claim 22, wherein:

said first guest terminal subsystem includes a first interactive input device, said
15 second guest terminal subsystem includes a second interactive input device and said interactive interrogations are defined to have a number of slots and a number of subslots, with each of said slots receiving first input information from said first interactive input device for each of said interactive interrogations and said second interactive input device
20 providing second input information in one subslot for less than all of said interactive interrogations.

27. A method, as claimed in Claim 26, wherein:

said number of subslots includes a first set of subslots and a second set of subslots, with said first set of subslots receiving input information during at least one time
25 different from input information received by said second set of subslots.

28. A method for providing information to a head end system of an entertainment system using a plurality of guest terminal subsystems having a plurality of interactive input devices, comprising:

assigning a first interactive output device of said head end system to a first
30 interactive input device of a first guest terminal subsystem of said plurality of guest terminal subsystems;

providing command information to a head end controller of said head end system related to said assigning of said first interactive output device to said first interactive input device;

receiving input information from said first guest terminal subsystem by said head end controller; and

sending said input information to said first interactive output device based on said command information.

5 29. A method, as claimed in Claim 28, wherein:

said assigning step includes receiving system information from a first guest terminal subsystem of said plurality of guest terminal subsystems by a host of said head end system.

30. A method, as claimed in Claim 28, wherein:

10 said providing step includes transmitting said command information to said head end controller by a host of said head end system.

31. A method, as claimed in Claim 28, wherein:

15 said sending step includes using a common interface to provide said input information to said first interactive output device and with said head end system including a plurality of interactive output devices including said first interactive output device and with said common interface communicating with each of said plurality of interactive output devices.

32. A method, as claimed in Claim 28, wherein:

20 said sending step includes translating said input information to input interactive signals compatible with said first interactive output device.

33. A method for providing information to a head end system of an entertainment system using a plurality of guest terminal subsystems having a plurality of interactive input devices, comprising:

25 receiving input information by a common interface in communication with a plurality of interactive output devices;

sending said input information to a first emulation assembly of a plurality of emulation assemblies of said head end system;

30 converting said input information by said first emulation assembly to input interactive signals compatible with at least a first interactive output device of said plurality of interactive devices;

utilizing said input interactive signals by said first interactive output device; and
transmitting output interactive signals to said first guest terminal subsystem that includes said first interactive input device.

34. A method, as claimed in Claim 33, wherein:

said receiving step includes providing said input information to a head end controller of said head end system and applying said input information to said common interface by said head end controller.

5 35. A method, as claimed in Claim 33, wherein:

said sending step includes using address information stored in memory of said head end system in communication with said head end controller.

36. A method, as claimed in Claim 33, further including:

10 configuring said first emulation assembly, wherein said first emulation assembly is compatible with said first interactive output device but not compatible with a second interactive output device of said plurality of interactive output devices.

37. A method, as claimed in Claim 36, further including:

15 reconfiguring said first emulation assembly, wherein said first emulation assembly is compatible with said second interactive output device but not compatible with said first interactive output device.

38. A method, as claimed in Claim 36, wherein:

said reconfiguring step includes using a host of said head end system.

1/5

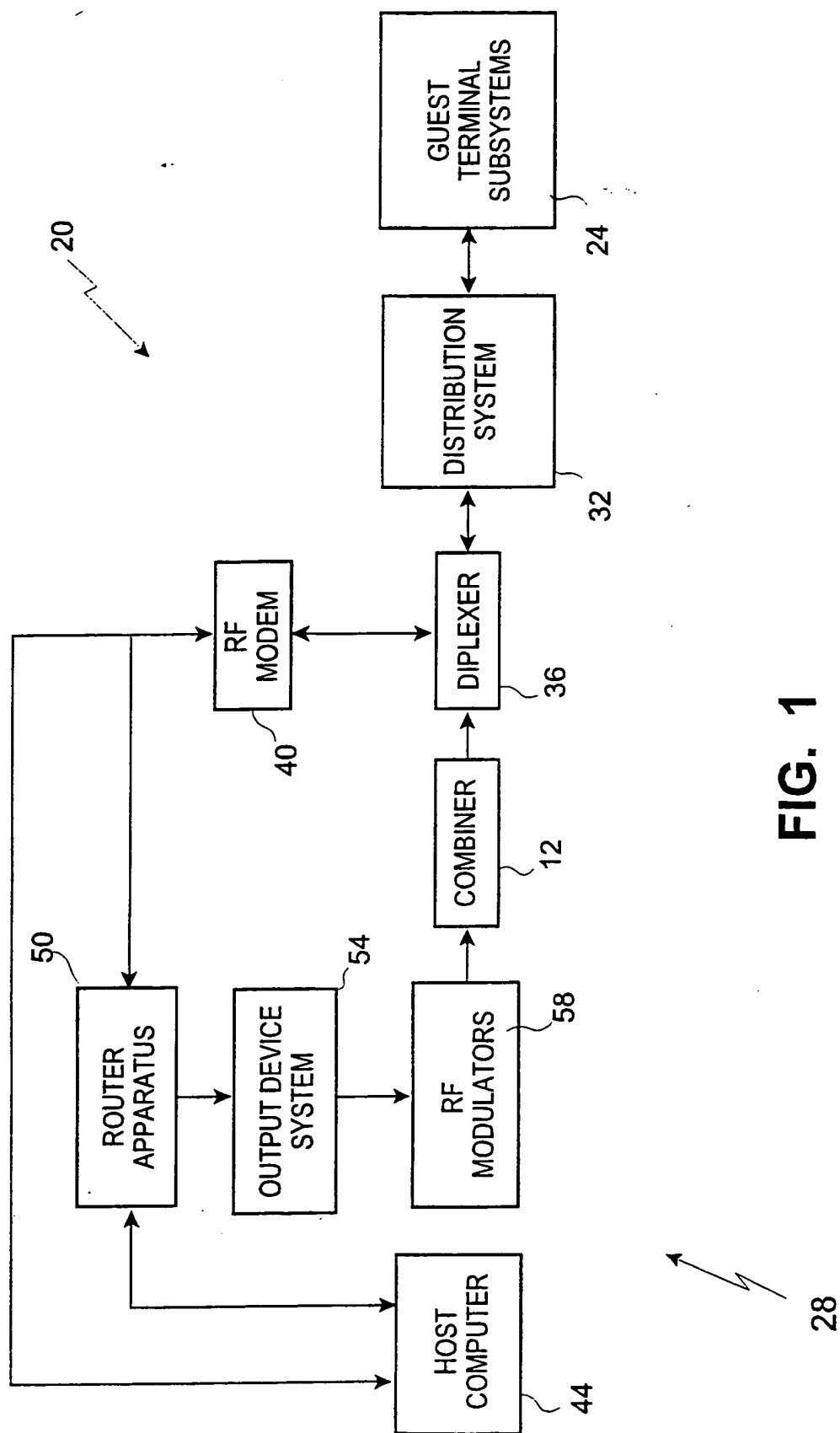
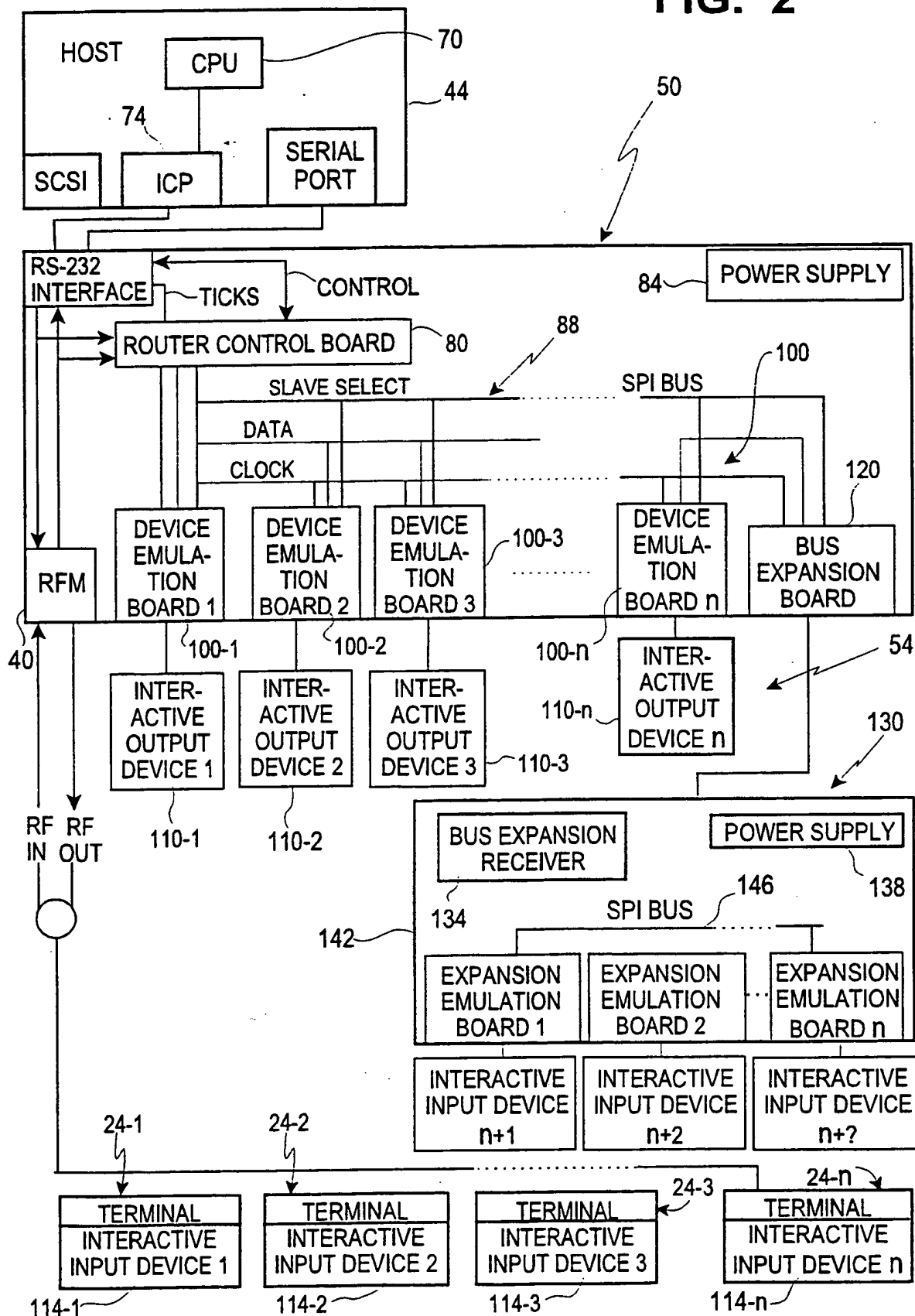


FIG. 1

2/5

FIG. 2



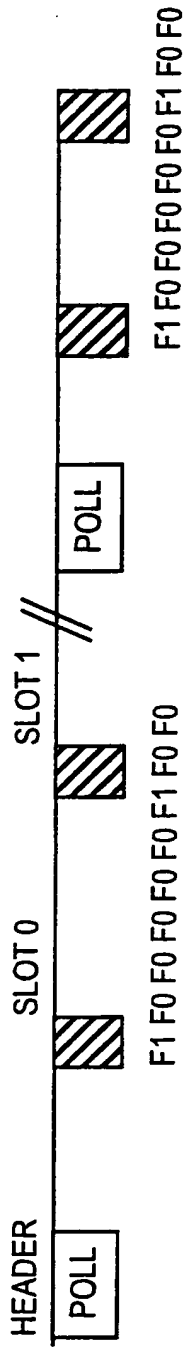


FIG. 3A

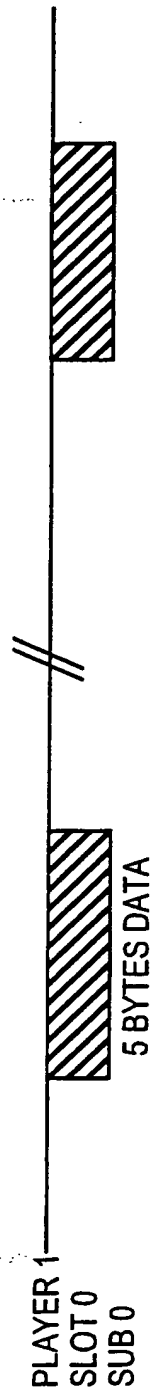


FIG. 3B

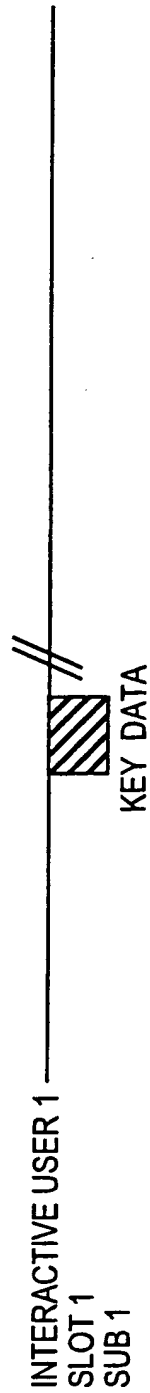


FIG. 3C

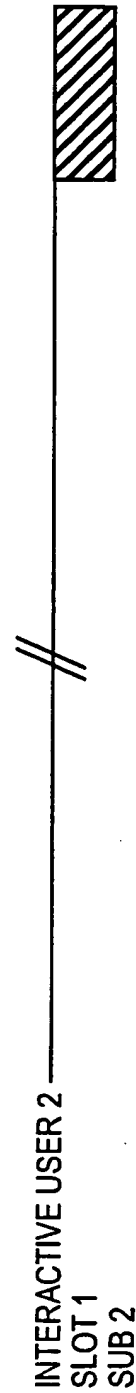


FIG. 3D

4/5

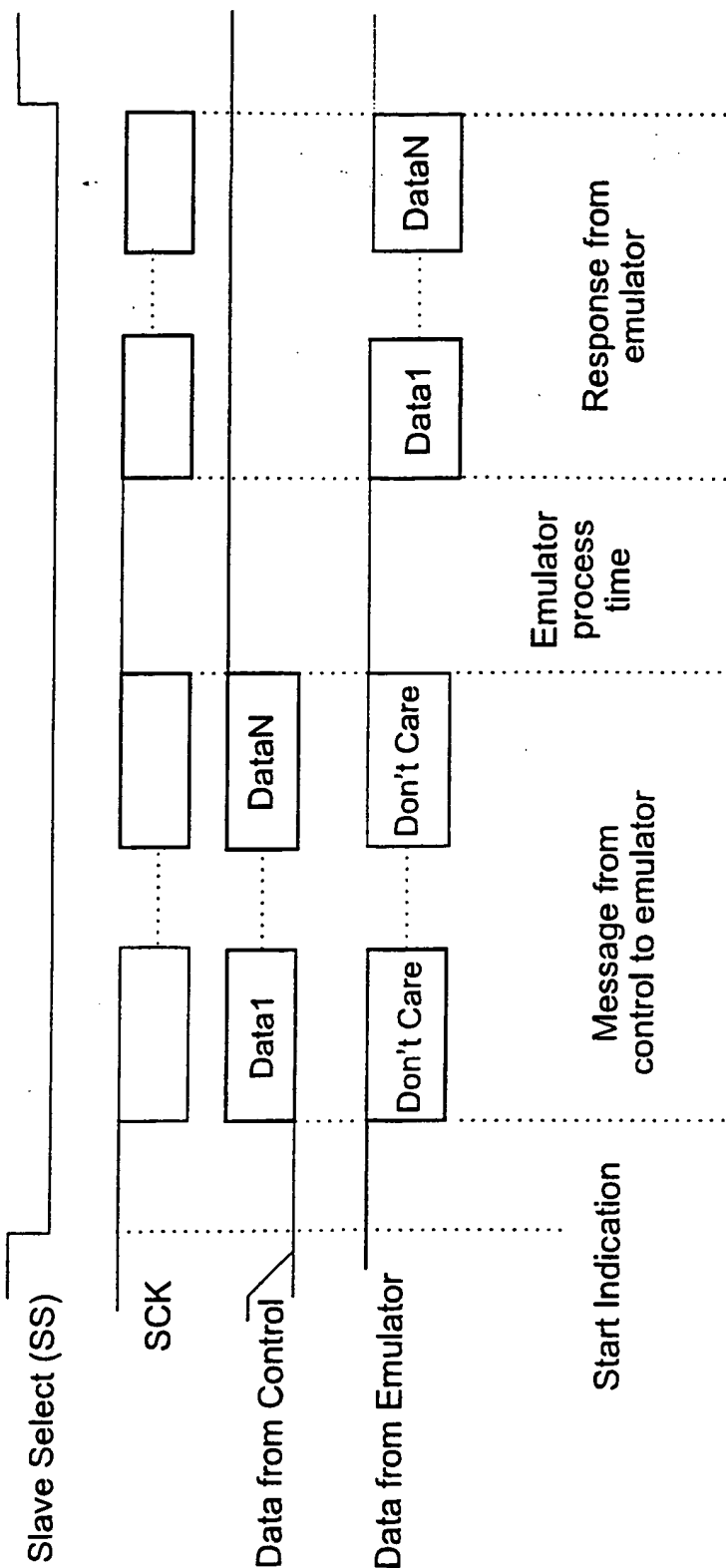


FIG. 4

5/5

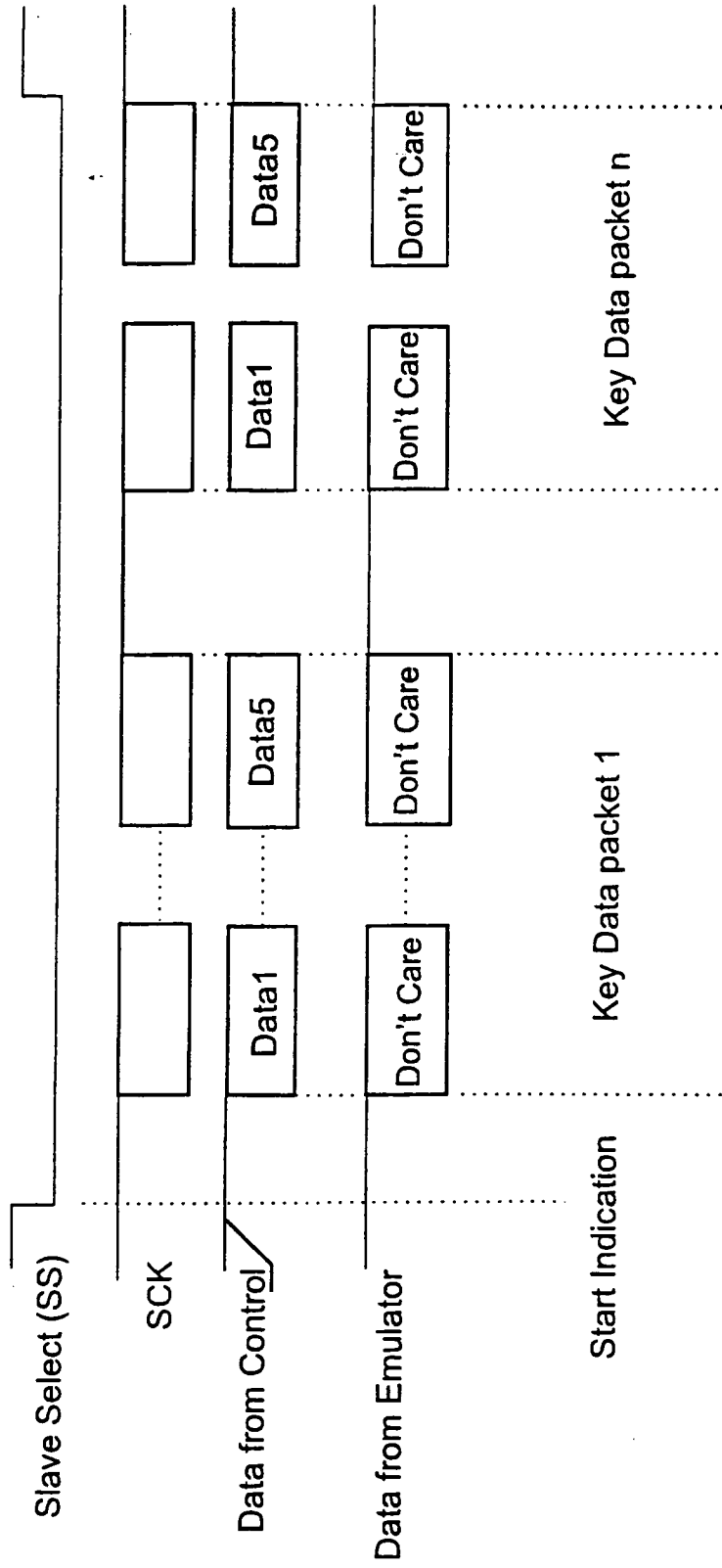


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/12258

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06F 13/38; 15/173

US CL : 710/2, 131; 709/208

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 710/2, 131; 709/208

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WEST USPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,721,842 A (BEASLEY et al.) 24 February 1998 (24.02.1998), col.1 lines 45-65.	1-38
Y	US 5,280,586 A (KUNZ et al.) 18 January 1994 (18.01.1994) abstract, col.1-3.	1-38
Y	US 4,837,677 A (BURRUS JR. et al) 06 June 1989 (06.06.1989), abstract.	1-38

☐ Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"R"

document member of the same patent family

Date of the actual completion of the international search

07 July 2000 (07.07.2000)

Date of mailing of the international search report

03 AUG 2000

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

D. Dinh

Telephone No. 305 9600

James R. Matthew